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December 9, 2003  
Project 806717

Mr. Gregory Herring  
U.S. Army Corps of Engineers  
P.O. Box 13287  
Building 527  
Offut AFB  
Offut, NE 58113

RE: Groundwater Monitoring Report for Second Quarter 2003 – Revised  
Duell and Gardner Landfill Site, Dalton Township, Muskegon County, Michigan

Dear Mr. Herring:

On behalf of U.S. Environmental Protection Agency (USEPA) Region V and the U.S. Army Corps of Engineers (USACE), Shaw Environmental Inc. (Shaw) submits this Groundwater Monitoring Report (GMR) for a quarterly groundwater sampling event at the Duell & Gardner Landfill during the second quarter of 2003. **Figure 1** is a map showing the site location. **Figure 2** is a site map that shows the location of groundwater monitoring wells. Water level measurements from site monitoring wells were gauged on June 17, 2003. Groundwater samples were collected from the corrective action monitoring wells on June 17, 2003 in accordance with the Duell & Gardner Landfill Monitoring Plan (LMP) dated March 4, 2002.

This report includes:

- Field data sheets (**Appendix A**);
- Laboratory reports with a chain of custody (**Appendix B**);
- A groundwater contour map including static water level elevations (**Figure 3**).

A copy of the laboratory data is being transmitted electronically to the MDEQ, as requested.

EPA Region 5 Records Ctr.



268256

### **Sample Identification**

Groundwater samples from these wells were collected in general accordance with the Duell & Gardner Landfill Monitoring Plan (LMP) dated March 4, 2002. Water samples were collected from the following corrective action monitoring wells and groundwater monitoring wells:

- RW-1, RW-2, RW-3, RW-4
- MW-14S, MW-14I, MW-14D
- MW-25S, MW-25I, MW-25D
- MW-31, MW-32, MW-33

Sample identification numbers presented in the laboratory results correspond to monitoring well identification numbers. One blind duplicate sample was collected from recovery well RW-1 and was labeled DUPLICATE. Matrix spike and matrix spike duplicate samples were collected from monitoring well MW-25D. A trip blank was also collected and submitted for laboratory analysis.

Static water levels were not collected from the following recovery/monitoring/temporary wells RW-1, MW-2, MW-5D, MW-12, and TW-29. Monitoring well MW-2 is located on the western edge of the property and could not be located during the water level measurement activities for the second quarter 2003 sampling event. Water levels have been measured in this well during previous sampling activities.

Monitoring well MW-5S and MW-5D are located property adjacent to the D&G Landfill. The wells are located near the residence on the adjacent property if residents are not home during the water level measurement event. Sample technicians have been instructed to obtain permission from the property owners before accessing the property and performing static water level measurements or sampling activities. If the property owner is not home then the sample technicians will not access the property. A water level in monitoring well MW-5D was not measured during the second quarter 2002 sampling event. This was an error during the water level measurement event. Water levels have been measured in this monitoring well during previous sampling activities.

Monitoring well MW-12 is physically bent. Static water levels can be measured but a groundwater sample cannot be collected with a disposable bailer. The top of casing for monitoring well MW-12 was re-surveyed by Driesemga and Associates during 2002 and the water elevations are based on this 2002 survey information. A water level in monitoring well MW-12 was not measured during the second quarter 2002 sampling event.

Shaw Environmental has not been able to locate monitoring well TW-29. This monitoring point could not be located during the first quarter 2002 sampling activities.

Static water levels could not be measured in the active recovery wells due to the presence of pump and discharge piping. A drop pipe was installed in recovery well RW-1 to allow water level measurements. A water level in monitoring well MW-12 was not measured during the second quarter 2002 sampling event.

**Appendix A** contains a copy of the field data sheets for the June 17, 2003 gauging and groundwater sampling event. **Appendix B** contains a hard copy of the laboratory analytical data for the June 2003 groundwater sampling event.

#### **Laboratory Analysis**

Water samples were submitted to Trace Analytical Laboratories for laboratory analysis of primary organic volatile compounds (following U.S. EPA Method 8260), secondary organic volatile compounds (following U.S. EPA Method 8270), and other compounds including n, n-dimethylaniline, n-ethylaniline, n-methylaniline, tetramethylurea, aniline, and crystal violet. The trip blank was submitted for laboratory analysis of primary volatile organic compounds.

#### **Flow Direction Review**

Groundwater elevations and flow patterns for the June 17, 2003 gauging event were compared to the previous flow patterns. **Table 1** presents a summary of the groundwater gauging data for the June 17, 2003. **Figure 3** shows a contour map of the static water elevations for June 17, 2003 and the general direction of groundwater flow. The June 2003 data indicates that the groundwater flow at the site is in a southeasterly direction, which is consistent with historical directions of groundwater flow for the D&G Landfill.

#### **Water Quality Summary**

Laboratory results for the June 2003 groundwater sampling event were compared to drinking water criteria and water quality standards established by the Michigan Department of Environmental Quality (MDEQ) for Part 201 (environmental response) and Part 22 (groundwater quality) under Michigan's Natural Resources and Environmental Protection Act (NREPA), Public Act 451.

Groundwater samples from monitoring wells RW-1, RW-2, RW-4, MW-14I, MW-14D, MW-25S and MW-25D detected chloroform, carbon disulfide, carbon tetrachloride, n, n-demethylaniline, n-methylaniline, tetramethylurea, and crystal violet at concentrations ranging from 11 to 110 micrograms per liter (µg/L).

<b><u>Analyte</u></b>	<b><u>Well Number</u></b>	<b><u>Concentration (µg/L)</u></b>
• Carbon Disulfide	MW-14D	8
	MW-25S	5.5
	MW-25D	5.1
• Carbon Tetrachloride	RW-1	48
	MW-25S	11
• Chloroform	RW-1	30

<b><u>Analyte</u></b>	<b><u>Well Number</u></b>	<b><u>Concentration (µg/L)</u></b>
• N, n-Dimethylaniline	RW-4	13
	MW-14D	12
	MW-14I	12
• N-Methylaniline	RW-4	14
	MW-14D	59
• Tetramethylurea	RW-1	110
	RW-2	73
• Crystal Violet	RW-1	60*
	RW-2	52*
	RW-3	58*
	RW-4	58*
	MW-14I	61*
	MW-25D	60*
	MW-25I	69*

\* - the analytical results for Crystal Violet are suspected of being false positives due to matrix interference.

Laboratory results from recovery wells RW-1, RW-2, RW-3 and RW-4 and monitoring wells MW-14I, MW-25D and MW-25I report crystal violet at 60 µg/L, 52 µg/L, 58 µg/L, 58 µg/L, 61 µg/L, 60 µg/L, and 69µg/L. The analytical results for crystal violet are related to false positive associated with matrix interference according to the laboratory analysis. Field data sheets indicate the water samples collected from these wells is clear and colorless.

**Table 2** provides a historical summary for chloroform, carbon tetrachloride, n,n-dimethylaniline, n-methylaniline, 2-ethylanniline, and tetramethylurea from groundwater sampling events at Duell & Gardner Landfill.

Laboratory results for the groundwater samples exceeded the drinking water criteria and water quality standards established by MDEQ for Part 201 and Part 22. Review of the laboratory results indicates the following exceedances:

<b><u>Analyte</u></b>	<b><u>Well Number</u></b>	<b><u>Concentration (µg/L)</u></b>
<b>Part 201 Criteria</b>		
• Carbon Tetrachloride (5 µg/L)	RW-1	48
	MW-25S	11

**Part 22 Standard**

• Chloroform (20 µg/L)	RW-1	30
• Carbon Tetrachloride (5 µg/L)	RW-1	48
	MW-25S	11

Carbon tetrachloride in recovery well RW-1 and monitoring well MW-25S is the only constituent that exceeds both the Part 201 cleanup criteria and Part 22 water quality standards.

Drinking water criteria and water quality standards have not been established by the MDEQ for N-methylaniline and tetramethylurea. Detectable concentrations of N-methylaniline and tetramethylurea were detected in monitoring well MW-14D, and recovery wells RW-1, RW-2 and RW-4 at concentrations ranging from 14 to 110 µg/L.

Laboratory results for chloroform, tetrachloride, and tetramethyl urea in recovery well RW-1 are noticeably higher than previous results over the past four quarters. Laboratory results for recovery well RW-4 and monitoring wells MW-14I, 14D, 25S, and 25D were lower or consistent with the past four quarters. The higher laboratory results in recovery well RW-4 are attributed to the fact that the treatment system was shutdown during sampling activities for maintenance and GAC changeout. **Appendix C** contains concentration versus time diagrams for recovery well RW-1 and RW-4 and monitoring wells MW-14I, MW-14D, MW-25S and MW-25I.

If you have any questions or comments regarding this report, please contact me at 734-367-1013.

Sincerely,

**SHAW ENVIRONMENTAL INC.**



Randy Sherman, CPG, CHMM  
Project Manager

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Attachments    Figures 1 to 3  
                    Tables 1 and 2  
                    Appendix A    Field data sheets  
                    Appendix B    Laboratory Analytical Data  
                    Appendix C    Water Quality Trend Diagrams

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## TABLES

**TABLE 1**  
**Groundwater Gauging Information**  
**June 17, 2003**  
 Duell and Gardner Landfill  
 Muskegon, MI

Well Identification	Date Measured	Top of Casing (USGS) (feet)	Ground (USGS) (feet)	Bottom of Screen (feet)	Depth to Bottom (feet)	Depth to Water (feet)	Water Elevation (feet)	Comments
MW-1	6/17/2003	665.40	662.80	654.40	11.00	7.42	657.98	
MW-2	6/17/2003	662.10	660.00	650.60	11.50		NA	cannot locate
MW-3	6/17/2003	661.70	659.65	650.20	11.50	6.52	655.18	
MW-4	6/17/2003	663.10	660.90	NA	NA	7.27	655.83	
MW-05S	6/17/2003	670.29	667.50	657.80	12.49	9.74	660.55	
MW-05D	6/17/2003	668.51	667.45	609.35	59.16	NA	NA	no access
MW-06S	6/17/2003	666.19	663.86	NA	NA	NA	NA	
MW-06D	6/17/2003	664.99	663.76	NA	NA	NA	NA	
MW-07	6/17/2003	667.36	664.83	654.83	12.53	8.56	658.80	
MW-08	6/17/2003	667.23	664.60	654.60	12.63	8.54	658.69	
MW-09	6/17/2003	667.38	665.12	655.12	12.26	9.13	658.25	dry
MW-10	6/17/2003	667.00	663.50	658.80	8.20	8.59	658.41	dry
MW-11R	6/17/2003	666.91	664.24	NA	NA	NA	NA	Abandoned
MW-11I	6/17/2003	667.20	664.40	NA	NA	NA	NA	Abandoned
MW-11D	6/17/2003	NA	NA	NA	NA	NA	NA	
MW-12	6/17/2003	667.14	664.94	654.94	12.20	NA	NA	Blockage at 8.8'
MW-13	6/17/2003	676.20	673.70	NA	NA	NA	NA	Abandoned
MW-14S	6/17/2003	670.21	668.01	654.61	15.60	12.49	657.72	
MW-14I	6/17/2003	669.45	667.27	624.45	45.00	11.81	657.64	
MW-14D	6/17/2003	670.95	667.76	604.95	66.00	13.02	657.93	
MW-14E	6/17/2003	670.71	668.18	573.18	97.53	10.78	659.93	
MW-15	6/17/2003	666.01	664.70	NA	NA	NA	NA	Abandoned
MW-16	6/17/2003	663.89	662.06	NA	NA	NA	NA	Abandoned
MW-17	6/17/2003	662.84	660.66	652.16	10.68	6.38	656.46	
MW-18	6/17/2003	663.54	661.31	NA	NA	NA	NA	Abandoned
MW-18I	6/17/2003	662.25	661.30	NA	NA	NA	NA	Abandoned
MW-19	6/17/2003	663.42	660.95	650.95	12.47	8.05	655.37	
MW-20	6/17/2003	662.06	660.18	651.68	10.38	6.64	655.42	
MW-21S	6/17/2003	662.69	660.78	650.78	11.91	6.29	656.40	
MW-21D	6/17/2003	663.25	660.91	590.91	72.34	7.05	656.20	
MW-22S	6/17/2003	662.13	659.83	649.83	12.30	7.36	654.77	
MW-22D	6/17/2003	661.78	659.98	611.58	50.20	7.07	654.71	
MW-23S	6/17/2003	661.43	658.75	648.75	12.68	6.90	654.53	
MW-23D	6/17/2003	661.61	658.74	609.24	52.37	7.24	654.37	
MW-25S	6/17/2003	668.10	666.20	651.95	16.15	10.56	657.54	
MW-25I	6/17/2003	668.21	665.07	621.21	47.00	10.70	657.51	
MW-25D	6/17/2003	667.46	665.86	601.46	66.00	9.59	657.87	
MW-26S	6/17/2003	662.68	661.36	647.76	14.92	6.22	656.46	
MW-26I	6/17/2003	662.74	661.21	617.61	45.13	6.19	656.55	
MW-26D	6/17/2003	663.35	661.29	593.29	70.06	6.30	657.05	
MW-31	6/17/2003	661.61	659.61	651.11	10.50	6.68	654.93	
MW-32	6/17/2003	662.13	660.25	650.98	11.15	6.79	655.34	
MW-33	6/17/2003	664.01	661.55	651.61	12.40	7.30	656.71	
MW-34	6/17/2003	NA	NA	NA	NA	7.82	NA	
MW-35	6/17/2003	NA	NA	NA	NA	7.35	NA	
MWPZ-1	6/17/2003	NA	NA	NA	NA	NA	NA	
TW-29	6/17/2003	NA	NA	NA	NA	NA	NA	cannot locate
IB	6/17/2003	NA	NA	NA	NA	NA	NA	
RW-1	6/17/2003	NA	NA	NA	NA	NA	NA	unable to gauge
RW-2	6/17/2003	NA	NA	NA	41.00	8.13	NA	
RW-3	6/17/2003	NA	NA	NA	36.50	7.40	NA	
RW-4	6/17/2003	NA	NA	NA	62.00	10.00	NA	

**TABLE 2**  
**Site Water Quality Data**  
**Duell and Gardner Landfill**  
**Muskegon, MI**

		Carbon Chloroform	Trichloroethene	Toluene	N,N-Dimethylaniline	N-Methylaniline	2-Ethylaniline	Tetramethyl Urea	Phenol	3-Methyl-Benzenamine	P-Toluidine	N-Ethylaniline			
PART 201 CRITERIA		100	5	5	790	53	16	NA	NA	NA	NA	15	NA		
PART 22 STANDARD		20	5	5	35	60	16	NA	NA	NA	35	NA	4.5	NA	
WELL ID	DATE														
RW-1 (TW-1)	7/1/2000	4.5	11	ND	ND	ND	ND	ND	59	ND	ND	ND	ND	NA	
	10/1/2000	11	22	ND	ND	ND	ND	ND	110	ND	ND	ND	ND	NA	
	12/1/2000	3.4	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	4/1/2001	66	130	ND	ND	ND	ND	ND	260	ND	ND	ND	ND	NA	
	6/27/2001	8.9	22	ND	ND	36	ND	ND	NA	ND	NA	NA	ND	ND	
	6/28/2001	8.6	18	ND	ND	ND	ND	ND	NA	48	ND	NA	NA	ND	
	8/29/2001	8.8	14	ND	ND	ND	ND	ND	NA	50	ND	NA	NA	ND	
	8/30/2001	4.4	8.9	ND	ND	ND	ND	ND	NA	59	ND	NA	NA	ND	
	7/1/2001	3.9	8.3	ND	ND	ND	ND	ND	NA	42	ND	NA	NA	ND	
	7/2/2001	4.0	7.5	ND	ND	ND	ND	ND	NA	43	ND	NA	NA	ND	
	7/3/2001	3.7	8	ND	ND	ND	ND	ND	NA	40	ND	NA	NA	ND	
	7/10/2001	3.8	18	ND	ND	ND	ND	ND	NA	34	ND	NA	NA	ND	
	7/20/2001	3.2	34	ND	ND	ND	ND	ND	NA	17	ND	NA	NA	ND	
	7/25/2001	3.8	21	ND	ND	ND	ND	ND	NA	15	ND	NA	NA	ND	
	8/6/2001	4.4	13	ND	ND	ND	ND	ND	NA	11	ND	NA	NA	ND	
	8/14/2001	4.2	12	ND	ND	ND	ND	ND	NA	13	ND	NA	NA	ND	
	8/20/2001	5.4	6.5	ND	ND	ND	ND	ND	NA	15	ND	NA	NA	ND	
	8/27/2001	8.9	8.1	ND	ND	ND	ND	ND	NA	48	ND	NA	NA	ND	
	9/6/2001	3.3	6.3	ND	ND	ND	ND	ND	NA	15	ND	NA	NA	ND	
	9/13/2001	4.8	12	ND	ND	ND	ND	ND	NA	16	ND	NA	NA	ND	
	9/17/2001	3.2	10	ND	ND	ND	ND	ND	ND	9	ND	NA	NA	ND	
	9/25/2001	2.8	12	ND	ND	ND	ND	ND	ND	6.4	ND	NA	NA	ND	
	10/18/2001	2.6	11	ND	ND	ND	ND	ND	ND	6.8	ND	NA	NA	ND	
	11/5/2001	3.1	9.3	ND	ND	ND	ND	ND	ND	12	ND	NA	NA	ND	
	12/7/2001	ND	8.6	ND	ND	ND	ND	ND	ND	9.4	ND	NA	NA	ND	
	4/4/2002	22	25	ND	ND	ND	ND	ND	NA	17	ND	NA	NA	ND	
	5/30/2002	8.4	16	ND	ND	ND	ND	ND	NA	13	ND	NA	NA	ND	
	6/26/2002	8.1	21	ND	ND	ND	ND	ND	NA	18	ND	NA	NA	ND	
	7/24/2002	5.8	40	ND	ND	ND	ND	ND	NA	6.5	ND	NA	NA	ND	
	9/30/2002	5.3	20	ND	ND	ND	ND	ND	ND	11	ND	NA	NA	ND	
	10/31/2002	3.4	15	ND	ND	ND	ND	ND	ND	7.7	ND	NA	NA	ND	
	12/5/2002	2.1	12	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	
	2/27/2003	3.1	9.4	ND	ND	ND	ND	ND	NA	12	ND	NA	NA	ND	
	3/27/2003	2.2	8.8	ND	ND	ND	ND	ND	NA	5.8	ND	NA	NA	ND	
	4/2/2003	3.7	8.8	ND	ND	ND	ND	ND	NA	8.1	ND	NA	NA	ND	
	6/17/2003	30	48.0	ND	ND	ND	ND	ND	NA	110	ND	NA	NA	ND	
	RW-2 (near MW-13)	5/1/2001	1.2	0.7	1.8	16	NA	NA	NA	NA	NA	NA	NA	NA	NA
		6/14/2001	ND	ND	ND	ND	ND	ND	ND	NA	8.5	ND	NA	NA	NA
		10/18/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
		4/4/2002	ND	ND	ND	ND	ND	ND	ND	NA	17	ND	NA	NA	NA
		10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND
		12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND
		4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	17	ND	NA	NA	ND
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	73	ND	NA	NA	ND	
	RW-3 (near GP-4/9)	5/1/2001	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
		6/14/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA
		10/18/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND
		4/4/2002	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA
10/1/2002		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	
12/5/2002		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	
4/2/2003		ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND		
RW-4 (near MW-14)	5/1/2001	ND	ND	ND	ND	ND	30	26	ND	ND	ND	ND	ND	NA	
	6/27/2001	ND	ND	ND	ND	ND	25	30	ND	ND	ND	ND	ND	NA	
	6/28/2001	ND	ND	ND	ND	ND	17	24	ND	ND	ND	ND	ND	NA	
	8/29/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	8/30/2001	ND	ND	ND	ND	ND	17	24	ND	ND	ND	ND	ND	NA	
	7/1/2001	ND	ND	ND	ND	ND	16	27	ND	ND	ND	ND	ND	NA	
	7/2/2001	ND	ND	ND	ND	ND	18	26	ND	ND	ND	ND	ND	NA	
	7/3/2001	ND	ND	ND	ND	ND	18	24	ND	ND	ND	ND	ND	NA	
	7/10/2001	ND	ND	ND	ND	ND	10	18	ND	ND	ND	ND	ND	NA	
	7/20/2001	ND	ND	ND	ND	ND	6.3	15	ND	ND	ND	ND	ND	NA	
	7/25/2001	ND	ND	ND	ND	ND	12	21	ND	ND	ND	ND	ND	NA	
	8/6/2001	ND	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND	NA	
	8/14/2001	ND	ND	ND	ND	ND	8.7	15	ND	ND	ND	ND	ND	NA	
	8/20/2001	ND	ND	ND	ND	ND	7.8	16	ND	ND	ND	ND	ND	NA	
	8/27/2001	ND	ND	ND	ND	ND	8.4	14	ND	ND	ND	ND	ND	NA	
	9/6/2001	ND	ND	ND	ND	ND	8.5	14	ND	ND	ND	ND	ND	NA	
	9/13/2001	ND	ND	ND	ND	ND	8.6	9.4	ND	ND	ND	ND	ND	NA	
	9/17/2001	ND	ND	ND	ND	ND	6.7	12	ND	ND	ND	ND	ND	NA	
	9/25/2001	ND	ND	ND	ND	ND	5.8	11	ND	ND	ND	ND	ND	NA	
	10/18/2001	ND	ND	ND	ND	ND	ND	13	ND	ND	ND	ND	ND	NA	
	11/5/2001	ND	ND	ND	ND	ND	ND	10	ND	ND	ND	ND	ND	NA	
	12/7/2001	ND	ND	ND	ND	ND	ND	8.0	ND	ND	ND	ND	ND	NA	
	4/4/2002	ND	ND	ND	ND	ND	11	22	ND	ND	ND	ND	ND	NA	
	12/5/2002	ND	ND	ND	ND	ND	8.5	14	ND	ND	ND	ND	ND	NA	
	4/2/2003	ND	ND	ND	ND	ND	7.8	15	NA	ND	ND	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	13	14	NA	ND	ND	NA	NA	ND	
	MW-7	6/27/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND

**TABLE 2**  
**Site Water Quality Data**  
**Duell and Gardner Landfill**  
**Muskegon, MI**

		Carbon Tetrachloride	Trichloroethene	Toluene	N,N-Dimethylaniline	N-Methylaniline	2-Ethylaniline	Tetramethyl Urea	Phenol	3-Methyl-Benzenamine	P-Toluidine	N-Ethylaniline			
PART 201 CRITERIA		100	5	5	790	53	16	NA	NA	NA	NA	15	NA		
PART 22 STANDARD		20	5	5	35	60	16	NA	NA	NA	35	NA	4.5	NA	
WELL ID	DATE														
MW-14S	7/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	12/1/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	
	4/1/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	6/14/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	ND	NA	
	10/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	ND	ND	
	4/4/2002	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	ND	NA	
	10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
	7/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.7	NA	
	10/1/2000	ND	ND	ND	ND	ND	24	ND	ND	ND	ND	ND	ND	NA	
	12/1/2000	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	NA	
MW-14I	4/1/2001	ND	ND	ND	ND	ND	24	ND	ND	ND	ND	ND	ND	NA	
	6/14/2001	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	NA	
	10/17/2001	ND	ND	ND	ND	ND	13	ND	ND	ND	ND	ND	ND	NA	
	4/4/2002	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND	ND	NA	
	10/1/2002	ND	ND	ND	ND	ND	15	ND	ND	ND	ND	ND	ND	NA	
	12/5/2002	ND	ND	ND	ND	ND	18	ND	ND	ND	ND	ND	ND	NA	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	12	ND	NA	ND	ND	NA	NA	ND	
	7/1/2000	ND	ND	ND	ND	ND	78	ND	ND	ND	ND	ND	ND	NA	
	10/1/2000	ND	ND	ND	ND	ND	29	87	ND	ND	ND	ND	ND	NA	
	12/1/2000	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	NA	
	4/1/2001	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	NA	
	6/14/2001	ND	ND	ND	ND	ND	14	73	ND	ND	ND	ND	ND	NA	
	10/17/2001	ND	ND	ND	ND	ND	19	120	ND	ND	ND	ND	ND	NA	
MW-14D	4/4/2002	ND	ND	ND	ND	ND	15	60	ND	ND	ND	ND	ND	NA	
	10/1/2002	ND	ND	ND	ND	ND	14	120	ND	ND	ND	ND	ND	NA	
	12/5/2002	ND	ND	ND	ND	ND	17	100	ND	ND	ND	ND	ND	NA	
	4/2/2003	ND	ND	ND	ND	ND	13	79	NA	ND	ND	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	12	59	NA	ND	ND	NA	NA	ND	
	7/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	12/1/2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	
	4/1/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/17/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	MW-19	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND
	MW-20	9/30/2002	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	ND	
	MW-21S	10/18/2001	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
	MW-21D	10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND
10/18/2001		ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	
MW-22D	10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
MW-22S	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
MW-23D	9/30/2002	ND	ND	ND	ND	ND	ND	ND	6.1	ND	NA	NA	NA	ND	
MW-23S	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
MW-25S	7/1/2000	ND	ND	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	NA	
	10/1/2000	46	110	ND	ND	ND	ND	ND	8	ND	ND	ND	ND	NA	
	12/1/2000	14	74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	4/1/2001	45	76	ND	ND	ND	ND	ND	140	ND	ND	ND	ND	NA	
	6/14/2001	ND	9.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/16/2001	11	110	ND	ND	ND	ND	ND	44	ND	ND	ND	ND	NA	
	4/3/2002	6.5	35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/1/2002	16	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	12/5/2002	1.1	55	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	4/2/2003	ND	7.3	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
	6/17/2003	ND	11	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
MW-25I	7/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	12/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	4/1/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	6/14/2001	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	NA	
	10/16/2001	ND	ND	ND	ND	ND	ND	NA	8.4	ND	NA	NA	ND	ND	
	4/4/2002	ND	ND	ND	ND	ND	ND	NA	28	ND	NA	NA	ND	NA	
	10/1/2002	ND	ND	ND	ND	ND	ND	ND	32	ND	NA	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	13	ND	NA	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	5.8	ND	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	
MW-25D	7/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	10/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	ND	NA	
	12/1/2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	4/1/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	
	6/14/2001	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	NA	
	10/16/2001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	4/4/2002	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	NA	
	10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	

**TABLE 2**  
**Site Water Quality Data**  
**Duell and Gardner Landfill**  
**Muskegon, MI**

		Carbon Tetrachloride	Trichloroethene	Toluene	Aniline	N,N-Dimethylaniline	N-Methylaniline	2-Ethylaniline	Tetramethyl Urea	Phenol	3-Methyl-Benzeneamine	P-Toluidine	N-Ethylaniline			
PART 201 CRITERIA		100	5	5	790	53	16	NA	NA	NA	NA	NA	15	NA		
PART 22 STANDARD		20	5	5	35	60	16	NA	NA	NA	35	NA	4.5	NA		
WELL ID	DATE															
MW-26S	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	10/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
MW-26I	10/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	10/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
MW-26D	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	10/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
MW-31	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
MW-32	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
MW-33	10/1/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	12/5/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	
	4/2/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	6/17/2003	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
MW-34 (near MW-16)	5/1/2001	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	10/18/2001	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	
	4/3/2002	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
MW-35 (near MW-18)	5/1/2001	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	10/18/2001	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	
	4/3/2002	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	6/27/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
IBP	6/28/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	6/29/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	6/30/2001	4.5	9.1*	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	7/1/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	7/2/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	7/3/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	ND	ND	
	7/10/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	7/20/2001	ND	1	ND	ND	ND	ND	ND	NA	4.3	ND	NA	NA	NA	ND	
	7/25/2001	ND	1.2	ND	ND	ND	ND	ND	NA	6.2	ND	NA	NA	NA	ND	
	8/6/2001	ND	1.5	ND	ND	ND	ND	ND	14	5.3	ND	NA	NA	NA	ND	
	8/14/2001	ND	2	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	8/20/2001	1.5	1.1	ND	ND	ND	ND	ND	NA	9	ND	NA	NA	NA	ND	
	8/27/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	9/6/2001	1.9	3.5	ND	ND	ND	ND	ND	NA	6.6	ND	NA	NA	NA	ND	
	9/17/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	9/25/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	10/18/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	11/5/2001	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	12/7/2001	ND	1.3	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	5/30/2002	ND	1.1	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	6/28/2002	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	7/24/2002	1.3	7.5	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND	
	9/30/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND
	10/31/2002	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND
	2/27/2003	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND
	3/27/2003	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	NA	NA	ND

Note:  
 All values in micrograms/liter  
 ND = Not Detected  
 NS = Not Sampled  
 NA = Not Available

\* = Data for IBP for 6/30/01 shows a detection of chloroform and carbon tetrachloride. Since these compounds were not detected in any of the other sampling events it is likely to assume that these concentrations were result of a mislabeled bottle with RW-1 samples on the same day. The concentrations detected mimic those of RW-1.

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